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DAKOTAS in the ANTARCTIC

A Study in Versatility

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DAKOTA (LC-47/R4D-5): Mt. Erebus in the background, 1 Dec. 1956.

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FOREWORD

No aircraft has had as long or as historically significant a career as the Douglas DC-3. It was built in both commercial and military versions, the latter named either Skytrain or Dakota. The aircraft began flying in 1935 and can still (1970) be found active in many parts of the world. It was natural that, when the United States Navy decided to return to the Antarctic after World War II, it turned to this veteran for aerial support. Used initially on *Operation Highjump* (1946-1947), the Dakota was reintroduced to Antarctica during *Operation Deep Freeze II* (1956-1957). Until 1960-61, it was the mainstay of our antarctic operations, and although its usefulness decreased after the introduction of the Hercules, it continued to be used until 2 December 1967.

The story of the great contribution made by the Dakotas to the development of the Antarctic is contained in the following pages. Brief appendices cover the use of the same type aircraft by Argentina and of an aircraft of similar appearance and characteristics by the Soviet Union. The research, writing, and editing was done in the History and Research Division of this command by its Chief, Dr. Henry M. Dater.

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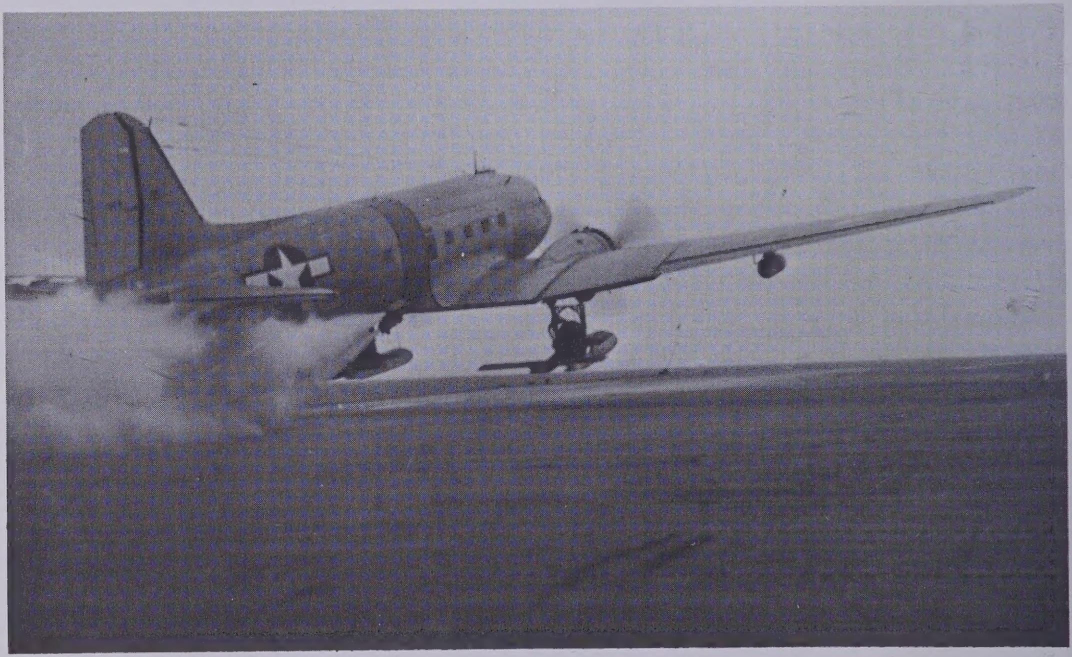

DAKOTA (LC-47/R4D-5): taking off with JATO from aircraft carrier *Philippine Sea* (CVA-47), 29 Jan. 1947.

PHOTO CREDITS

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DAKOTAS IN THE ANTARCTIC

The Skytrain or Dakota, affectionately known as the "Gooney Bird," is probably the most durable and versatile aircraft ever built. First flown on commercial airlines in 1935, many are still flying in all parts of the world. Called a DC-3 by the manufacturer, it was given the military designation of C-47 by the Army Air Corps and R4D by the Navy, until the two systems were amalgamated in 1962. By that time the many changes and modifications made to the original design had caused the Air Force, as successor to the Air Corps, to designate a later model as a C-117. When winterized, the aircraft had the letter "L" prefixed to its basic designation, thus the ski-equipped LC-47s and LC-117s that appear in the later years of antarctic history. To aviators, no matter how it was altered, it was still the "Gooney Bird."

THE PIONEERS

During World War II, pilots of the Army, Navy, and Marine Corps had flown the Gooney Bird over such disparate areas and climates as the Burmese jungles, African deserts, and Arctic tundra. Someone even experimented with putting floats on it, and the Royal Canadian Air Force had already fitted it with skis before hostilities ended. In preparing for *Operation Highjump* (1946-1947), the U.S. Navy, after examining the aircraft available, decided to use six ski-equipped R4Ds to conduct exploratory flights from Little America. Because it was assumed (incorrectly, as later events were to show) that the distance from New Zealand to Antarctica exceeded the airplanes' range, they would be launched from the deck of the aircraft carrier *Philippine Sea* at the edge of the pack ice. This could be done with the aid of JATO (jet-assisted takeoff), then a comparatively new device.

There still remained a problem; hitherto, Gooney Birds had been mounted either on wheels or skis, but not on both. In the short period available to prepare for the expedition, there was no time to seek a sophisticated solution, so a simple one was effected: a slot was cut in the skis through which the wheels protruded. The mechanism was such that the skis could have a 1-, 3-, or 6-inch clearance over the deck at time of takeoff. Actually, the 3-inch adjustment was used when the aircraft were launched in the vicinity of Scott Island. The first R4D, with Rear Admiral Richard E. Byrd on board, took off at 1214 [GMT] on 29 January 1947, with Commander William M. (Trigger) Hawkes, USN, as pilot. It circled over the carrier for 17 minutes until the second plane got into the air. In company, the two pioneers made the 600-mile flight to Little America, where they were sighted at approximately 1800. Hawkes had no difficulty locating the marked landing area and touched down at 1816 (0516 on 30 January, local time). Rear Admiral Richard H. Cruzen, USN, Task Force Commander, was on hand to greet Admiral Byrd. When the two veterans of the United States Antarctic Service Expedition (1939-1941) met, Admiral Byrd reportedly said, "Well, we're home again."

Once *Philippine Sea* learned of the safe arrival of the two aircraft, the other four were launched and made their way to Little America. The ski-wheel combination had accomplished its purpose, but 3 inches of wheel protruding through the skis was found to cause excessive drag when taxiing on snow. The wheels were, therefore, removed from all 6 aircraft and on two of them, the slots in the skis covered by an improvised plate. This innovation, however, proved to have no significant effect on the planes' performance.

Operations over the continent commenced on 4 February and were terminated on 21 February. During this brief period, 39 flights were conducted for a total of 260 hours in the air. It was found that a gross weight of 33,000 pounds could be lifted from unprepared snow. At first JATO was used, but as the temperatures dropped and the snow hardened, unassisted takeoffs were made successfully with the same weight. Although the aircraft could take off from unprepared snow, it was found that dragging the strip greatly facilitated the process. Landings, however, were made by preference under open field conditions to cut down the length of slide out.

The principal mission of the Gooney Birds was to explore and photograph the interior. In all, 28 photographic flights produced 21,000 negatives covering the periphery of the Ross Sea and parts of Marie Byrd Land. An exploratory flight on 15 February, with Admiral Byrd aboard, crossed the South Pole and flew 60 miles beyond it. The flags of the countries belonging to the newly established United Nations were ceremoniously dropped as the plane passed over the Pole. On four occasions, airborne magnetometers were tested by towing them aloft, and the results were determined to be useful for scientific investigation.

When flying was terminated for the season, the R4Ds had to be left at Little America. They could not be landed aboard the carrier, and no other ship of the Task Force was large enough to accommodate them as cargo. They were faced into the wind and their skis were lowered several feet into the snow, to anchor them firmly. Oil was drained, classified instruments removed, and fabric control surfaces stored inside the fuselages. These aircraft were seen the following season when the icebreakers *Edisto* and *Burton Island* visited the Bay of Whales from 29 January to 3 February 1948. Snow was cleared from one of the R4Ds and its engines started, but no attempt was made to fly. In 1955, another icebreaker, USS *Atka,* was sent to Antarctica to reconnoiter base sites for the coming International Geophysical Year (1957-1958). On 14 January, the ship vainly searched for the Bay of Whales. A gigantic calving in the Ross Ice Shelf had removed the Bay and, along with it, about two-thirds of Little America IV, including the airstrip and the aircraft left on it, starting those pioneer Gooney Birds on a drifting path to a watery grave.

RETURN TO THE ANTARCTIC

The United States program for the International Geophysical Year was an ambitious one, calling for much logistic support, including an unprecedented amount of aviation activity. The support mission was delegated to the Navy which gave its task the nickname *Deep Freeze* and organized a special aviation unit, Air Development Squadron Six (VX-6, now Antarctic Development Squadron Six, VXE-6). In picking aircraft for the squadron—and a variety was assigned to it—there was a need for some capable of being fitted with skis: while it was possible for wheeled aircraft to land on and take off from areas of smooth fast sea ice, such as existed in McMurdo Sound, operations from an ice shelf, such as that which existed at Little America or from the polar plateau could only be conducted on skis. The Gooney Bird was an obvious candidate, both because of the previous experience with it and because a great many were still available. Two (an R4D-5 and R4D-6) were assigned to VX-6 for *Operation Deep Freeze I* (1955-1956). To simplify the maintenance problems, the R4D-6 was modified to resemble as closely as possible an R4D-5, including the type of engines.

By this time, a landing-gear system had been devised that permitted a pilot the choice of using either wheels or skis, according to the nature of the landing area. The two aircraft were fitted with this ski-wheel combination and also with photographic equipment. Because plans called for a fly-in from New Zealand to McMurdo Sound, four 200-gallon auxiliary fuel tanks were installed in the fuselage of each plane. This rework was not completed until the last minute, and the crews had only one day for familiarization before starting on the flight from Naval Air Station, Patuxent River, Maryland, to Chirstchurch, New Zealand. Initially, they appeared to start off in the wrong direction, going to Alaska en route to Hawaii because no other single over-water leg was as long as the distance between the west coast and Oahu. The flight down, although long, was uneventful. The R4D-5 arrived at Christchurch on 30 November and the R4D-6 on 2 December, in plenty of time to get ready for the planned fly-in.

By mid-December, the miscellany of aircraft belonging to VX-6 was set to go. Besides the Gooney Birds, there were three other types that were to make the flight to Antarctica: two ski-equipped P2V[1] Neptune patrol planes, two R5D (C-54) Skymasters and two UF-1 Albatross flying boats, which could also land on wheels or skis. Because the Dakotas and Albatrosses would operate at near the limit of their range, they were moved to Dunedin, 178 nautical miles south of Christchurch, for the flight to McMurdo.

On 20 December, the ships assigned to the operation were strung out 250 miles apart from New Zealand to Antarctica to provide meteorological and navigational information—and rescue services, if needed. The weather appeared favorable, and the task force commander, Rear Admiral George J. Dufek, gave the order to start. All eight planes used JATO to get off the ground. Despite higher head winds than had been expected, the Neptunes and Skymasters made satisfactory progress, but as the point of safe return was approached, it became evident that the Gooney Birds and Albatrosses were in trouble. To make the journey successfully, they needed to maintain an average ground speed of 115 knots. For the first hours, however, they had, as a group, achieved only 105 knots. Reporting their predicament, the pilots proposed to continue on in the hope that conditions would improve, failing which they would attempt a landing at Cape Adare, about 400 miles north of McMurdo Sound. Admiral Dufek refused to accept the risk to planes and men and instructed them to return to New Zealand. The pilots complied with this order but did so, as they radioed the admiral, "under protest." No further attempt was made to fly either type to Antarctica that season.[2]

DEEP FREEZE II

The second season of operations proposed to add to Little America V and McMurdo Station[3] (which were built the previous year), three additional stations along the coast and two inland. One of these, Byrd Station, would be supported by tractor train out of Little America V; the success of the other, to be built at the geographic South Pole, was predicated upon the ability of large Air Force cargo planes to drop building materials and supplies and of Navy ski-equipped aircraft to deliver men and delicate scientific instruments. VX-6 started the season with only one P2V, because its second one had been lost in Venezuela during February 1956 while en route from the United States to Antarctica. Much, therefore, depended upon the four R4Ds assigned to the operation. This dependence was further increased when, on 17 October, the remaining P2V crashed at McMurdo on the fly-in from New Zealand. The Dakotas that were on this same flight arrived under conditions of poor visibility, but all managed to set down safely.

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[1] Redesignated LP-2J in 1962.

[2] The Albatross, called a "triphibian" in the reports, was dropped from the inventory of VX-6 and never participated in antarctic operations.

[3] Originally designated Naval Air Facility, McMurdo, the name was changed to McMurdo Station in late 1961. The title McMurdo Station is used throughout this monograph.

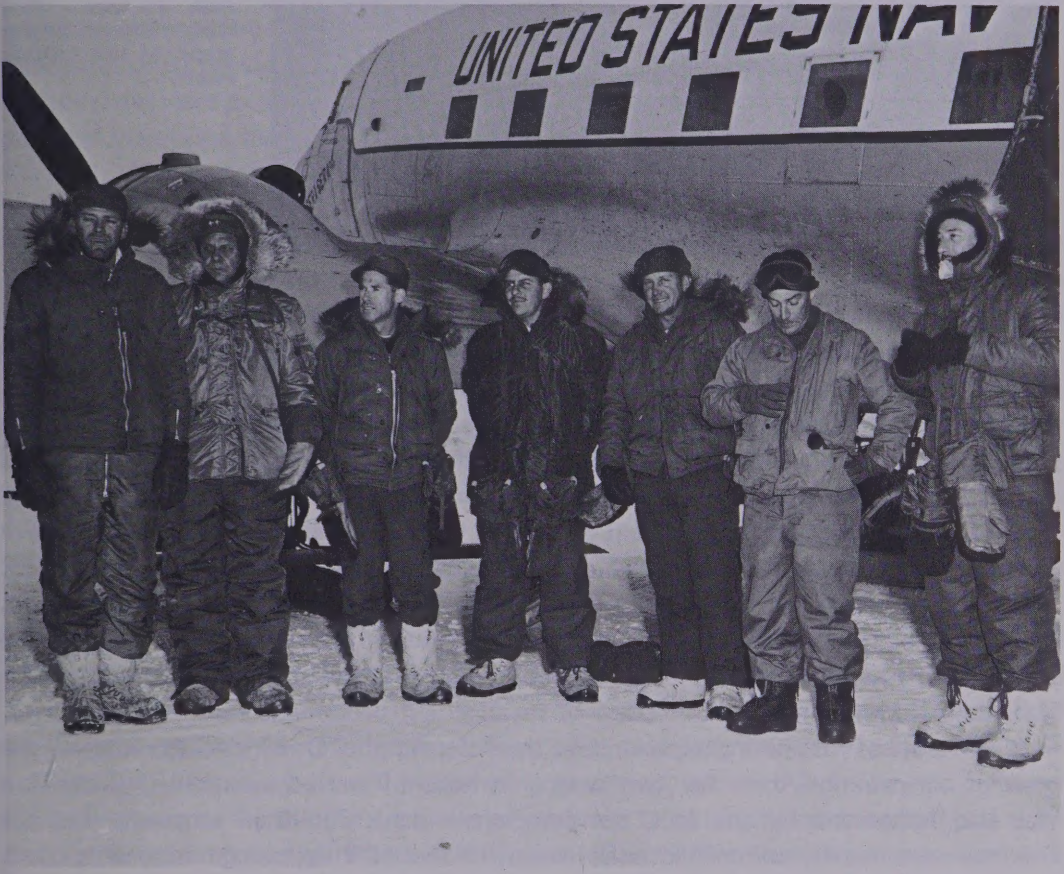
Upon arrival, the aircraft were put to work. Before commencing flights to the South Pole, it was necessary to put in an auxiliary summer station near the foot of the Beardmore Glacier. A principal function of this installation was to serve as a refueling stop for the Gooney Birds on their South Pole flights. While Admiral Byrd had flown nonstop from Little America over the Pole and back in 1947, it was believed to be impossible to fly from McMurdo with a significant load of passengers and cargo, land at the South Pole, and make the trip back without refueling on the return flight. The auxiliary station could also furnish useful weather information and serve as a base for search and rescue operations. The commanding officer of VX-6 made a reconnaissance flight on 26 October, and a site at 84°54′S., 166°00′W. was chosen. Despite the fact that this location was quite close to the foot of Liv Glacier, up which Admiral Byrd had flown in 1929, the station was designated as the Beardmore-Scott Auxiliary Air Base.

On 28 October, four men with tents and supplies were flown to the site in two R4Ds. The aircraft commanders felt it imprudent to wait any longer than absolutely necessary; as one of the pilots remarked, "We just had to push them out the door with their gear and take off." Weather closed in, and it was not until two days later that an Air Force C-124 Globemaster dropped additional supplies and drums of aviation gasoline, and only on 31 October that the remaining four men of the station complement arrived. It was none too soon, for that same day they had their first visitors: Admiral Dufek and the first party to stand at the South Pole since Scott, 44 years previously.

FIRST LANDING AT THE SOUTH POLE

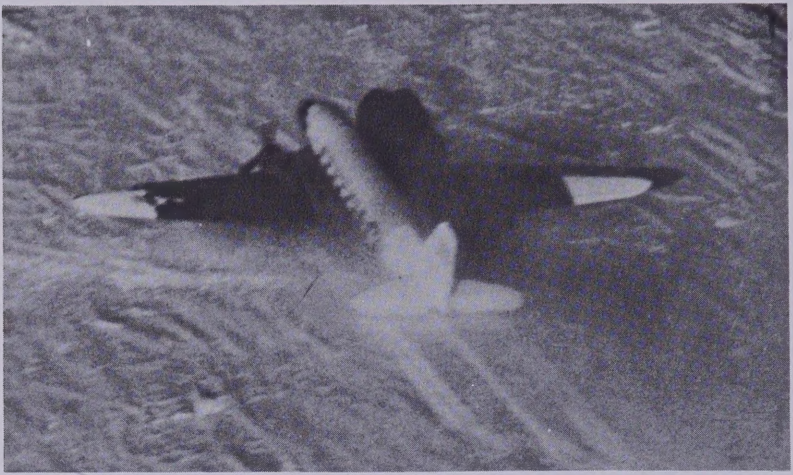
Before sending construction personnel to the polar plateau, Dufek was determined that a test landing should be made, and he believed that he should go along to see for himself. So did Captain Douglas Cordiner, Commanding Officer of VX-6, whose men would be risking their lives in the planes. For pilot, they chose Lieutenant Commander Conrad S. (Gus) Shinn, who sometimes doubled as camp barber. Co-pilot was "Trigger" Hawkes, by now a captain and the Navy's most experienced antarctic flyer. Lieutenant John R. Swadener was navigator, and the crew consisted of Petty Officers John P. Strider and William A. Cumbie. Two other aircraft were to accompany the flight: a Navy Skymaster and an Air Force Globemaster. They were to follow the Dakota up the Beardmore, then fly ahead to the Pole, where they would help with the navigation and circle overhead to take pictures of the historic event. They also were prepared to drop survival gear.

As the Dakota, named *Que Será Será*, churned up the Beardmore Glacier, the Skymaster developed engine trouble and turned back. The Globemaster, piloted by Major C. J. Ellen, pushed on to what its navigator calculated to be the position of the Pole. As Shinn approached, neither he nor anyone else knew what to expect. One theory held that the plateau would be covered with deep, soft snow into which the skis would sink irretrievably; others had quite the opposite view, that the surface would be hard and ruffled with sastrugi. During the approach, oil pressure fell off and oil streamed from the engines. Shinn reported that his instrument panel was lighting up like a Christmas tree. From above, Major Ellen soothingly radioed, "Don't worry Gus, if you can't get off I'll belly land this baby and give you a warm house to live in."



FIRST AMERICANS AT THE SOUTH POLE: L-R: John P. Strider, AD2; RADM George J. Dufek; LCDR Conrad S. Shinn; LT John R. Swadener; William A. Cumbie, AT2; Capt. William Hawkes; and Capt. Douglas Cordiner.

On that encouraging note, Shinn made three low-level passes to examine the surface, and then brought the plane in. It bounced a little on the sastrugi and came to a stop. It was 0834 (GMT) on 31 October 1956. Admiral Dufek stepped from the plane, the first man to stand at the South Pole since Amundsen and Scott. He was struck by the cold, 58°F. below zero, that was intensified by a wind of 10 to 15 knots. Followed by Cordiner, bearing an American flag, he quickly settled the argument about the nature of the surface. He had to use an ice ax to plant the banner. While the pilots alternated in the cockpit to keep the engines turning over, the rest of the crew set out a radar reflector to guide future flights and tried to take photographs. Only one or two snapshots were taken before all cameras froze, making this probably the worst recorded event in recent antarctic history.



QUE SERÁ SERÁ: Landing at the South Pole 31 Oct. 1956. Only known photograph of this historic event.

After 49 minutes on the ground, Dufek said, "Let's get the hell out of here," and they all climbed back into the plane. Shinn revved up the engines, but nothing happened. The skis had frozen fast. Four JATO bottles failed to shake the plane loose. Shinn quickly fired the remaining 11 in two sets of four followed by one of three. To those circling above, it momentarily looked as if the *Que Será Será* had exploded and caught fire as it disappeared in a swirl of flame, smoke, and snow. It shortly reemerged as Shinn fought successfully to get it airborne. Course was set for the Beardmore with Ellen zigzagging along above and behind. When he saw the Dakota safely on the deck at Beardmore-Scott Base, he raced for McMurdo Station to spread the good word. Soon, congratulatory messages were pouring in from all parts of the world. *Que Será Será* had become a marked aircraft; when its antarctic days were over, the Navy retired it to the National Air Museum.

As a result of his chilling experience at the Pole, Admiral Dufek decided to delay the start of construction there for two weeks, in hope of warmer weather. His decision was also influenced by the fact, not mentioned in his published accounts, that the Dakotas were heavily committed elsewhere, with two of them being temporarily down for repairs.

ALONG THE ARMY-NAVY TRAIL

Of equal priority with the establishment of South Pole Station was the erection of another inland base to be named for Admiral Byrd. Building materials and supplies would be delivered to the site at approximately 80°S., 120°W. by tractor trains from Little America V, but before this could be undertaken, a safe trail had to be laid out. If this were to be done, the deliveries made, and the station built during a single season, there was no time to spare. Even though this was to be primarily a surface operation, numerous forms of air support were required.

The first R4D landed at Little America V on 26 October 1956, bringing from McMurdo Station the members of the trail party along with their equipment and also mail for the station. Four days later, another R4D, with ground support personnel aboard, arrived to conduct reconnaissance flights along the proposed route. After four such flights, the plane was relieved and went back to McMurdo, but returned on 9 November to cover an area previously missed. By this time, the trail party was four days out and was approaching the heavily crevassed area where the ice falls from the Rockefeller Plateau to the Ross Ice Shelf. Further reconnaissance flights were flown after the crevassed area had been crossed.

Much of the aerial support furnished the trail party was done by single-engine Otters (UC-1s) also operating from Little America. These aircraft, however, lacked the range and carrying capacity of the Dakotas, so it was the latter that resupplied the trail party with most of its provisions and fuel. Finally, after the trail had been laid out, two heavy tractor trains were to deliver building materials and supplies for Byrd Station. To sustain all these operations, two Dakotas established a 20,000-gallon fuel cache at mile 240 along the trail. The fuel was carried in fuselage tanks and hand-pumped into rubber bladders at the site.

The trail party reached 80°S., 120°W. on 18 December, and its leader, Major Merle Dawson, USA, selected the exact site for Byrd Station. The first of the two tractor trains with building materials, supplies, and construction personnel arrived 5 days later. On the same day, the station recorded its first R4D landing. Between that date and 7 March 1957, 14 flights were made, 11 of them before 23 January. The planes usually did a quick turnaround at Byrd, pausing only long enough to discharge and embark passengers and cargo. In addition to the fuel cache, the Dakotas and Otters lifted 20 tons of supplies and explosives in support of Byrd Station operations.

TO THE POLE AGAIN

While the trail party was probing its way across the belt of crevasses at the boundary of the Ross Ice Shelf, activity resumed at McMurdo Station. On 1 November, when Admiral Dufek had announced his decision to postpone the beginning of South Pole construction, the morale of the construction party had sunk markedly. It revived, however, as the R4Ds were put back in operating condition, and the Air Force unit prepared its Globemasters. By the 15th, all was in readiness to put in the advance party of eight men under Lieutenant (jg.) Richard A. Bowers. Two R4Ds were required to carry the men with their tents, food, equipment, and dogs. The Dakotas were to be preceded by a Navy R5D Skymaster, to report the weather, and accompanied by an Air Force Globemaster that would drop additional supplies and equipment.

The start was delayed first by a communications blackout and then by bad weather. The planes finally got away on the 19th. Although the Skymaster on its first try returned to McMurdo with a feathered propeller, it made it on the second attempt. The Globemaster had no difficulty and went on to circle over the South Pole awaiting the arrival of the Dakotas, which took off at 0500 (GMT) (1700 local). On board the two aircraft were eight men and 11 dogs, together with their gear. Loads were so apportioned that either group would be self-sustaining. The flight turned out to be uneventful; for once the weather favored the enterprise, and the R4Ds set down at 1245 GMT (0045 on

20 November in McMurdo time). The temperature was minus 20°F. with 5 knots of wind. "It was," as the official report commented, "a beautiful day." The only hitch developed when Lt. (jg.) Bowers had time to break out his theodolite and calculated that they were 8 miles from the South Pole rather than right on the button as the pilots had assured him. This mistake was rectified a few days later when the party shifted position by dog sled.

That the faithful Gooney Bird, especially the R4D-5 and -6 models in use during *Deep Freeze II,* possessed only marginal characteristics for its work at the South Pole was evident on every flight. Of the four planes assigned the operation, three had skis coated with polyethylene and one with Teflon. Only the last could taxi under its own power on the high plateau. Even after an airstrip had been dragged, each takeoff was an adventure. As the JATO bottles fired off, the plane disappeared in a cloud of smoke and snow through which the spectators on the ground anxiously strained their eyes to see whether the pilot had made it. Then, to gain carrying capacity, fuselage fuel tanks had been eliminated, and another field landing had to be executed at Beardmore Station to pick up enough fuel to return to McMurdo. Even then they did not always make it back. On 13 February, 1957 an R4D developed an oil leak on the return flight and landed on the ice shelf, 260 miles south of McMurdo. For three hours the plane mechanic struggled with the problem, using such tools as he had on hand, before he managed to patch up the engine sufficiently to complete the trip.

THE YEAR OF THE GOONEY BIRD

The Navy had hoped to use P2V Neptunes for much of the South Pole work. These aircraft had greater range, power, and carrying capacity than the Dakotas, but of the three assigned to VX-6 for *Deep Freeze II,* only one was ready at the beginning of the season, and it crashed at McMurdo on its initial flight from New Zealand. The second arrived in Antarctica on 4 December and the third on 3 January. The P2Vs proved of limited usefulness because they early exhibited serious deficiencies in their ski rigs. They were withdrawn in mid-January 1957, leaving the R4Ds to carry on with the tasks of transferring personnel and non-droppable equipment to Byrd and South Pole Stations.

The R4Ds truly had the stage to themselves at this time, for in mid-December, the softening of the sea-ice runway at McMurdo under the influence of the summer sun, combined with a shortage of aviation gasoline, had caused the Air Force to pull its Globemasters back to New Zealand before all personnel, equipment, and supplies had been delivered to the South Pole. Indeed, it looked for a time as if they might not be able to return. Admiral Dufek then decided that, even if the worst occurred, some sort of program should be conducted at the South Pole with the personnel and equipment already on hand, and ordered VX-6 to fly in enough food to maintain the station complement for a year. The burden again fell upon the Dakotas.

In his final report of the operation, the squadron's commanding officer commented that the R4Ds had "performed as dependable work horses." The 16 aircraft flown by VX-6 in the Antarctic during *Deep Freeze II* accumulated a total of 1,662.8 hours in the air, of which the four Dakotas accounted for 906.4, or well over half. This they accomplished on 222 flights that included not only their support of Byrd and South Pole

Stations but also a shuttle between Little America V and McMurdo, as well as numerous utility missions. They experienced amazingly few maintenance problems, there being only one engine change during the entire season, even though they regularly operated with gross weights of over 38,000 pounds. The ambitious United States program, especially the manning and construction of Byrd and South Pole Stations, could not have been accomplished without the support of the faithful Dakotas. *Deep Freeze II* was the year of the Gooney Bird. Although the aircraft continued to operate in the Antarctic until December 1967, it never again occupied quite so pivotal a position.

When the last summer support personnel left the Antarctic in early February 1957, they left behind the Dakotas, Otters, and helicopters with pilots and maintenance men. The planes continued to fly until 12 April, when the approaching darkness brought an end to flight operations. During that period, the R4Ds made 19 flights, including 11 shuttles between Little America and McMurdo Station, several cargo deliveries to Byrd Station, and a passenger lift to South Pole. With the cessation of regular flying, the Dakotas were stored in the open at Little America. Three were secured for the winter, but one, along with an Otter, was kept in operating status. Training flights were made throughout the winter, as weather permitted, with at least one flight being made each month.

INTO *DEEP FREEZE III*

With the return of daylight in August 1957, the stored aircraft were dug out and returned to flying status. On 3 September, two R4Ds moved to McMurdo Station, from which they supported the construction and stocking of a summer refueling and weather station on the Ross Ice Shelf near the Beardmore Glacier. This facility was subsequently named Liv Station.[1] Icing in the planes' fuel system caused some power failures on takeoff and dealyed some flights, but the results were not serious. Liv Station was fully operational when the first of VX-6's long-range aircraft returned to McMurdo Station on 1 October 1957.

Among these planes were two R4D-8s, a modified, higher-performance version of the R4D-5 and -6 previously in use. It was slightly longer, had larger fuel and carrying capacities, and possessed both faster cruising speed and greater range. While generally similar in appearance to its predecessor, the R4D-8 had a squared off tail assembly, rather than a rounded one. The changes had been sufficient for the Air Force to regard it as new aircraft and designate it the C-117. To the pilots, it remained the Gooney Bird, or just plain "Goon."

The two new aircraft, accompanied by a Neptune, left Quonset Point Naval Air Station, Rhode Island, on 4 September 1957 and arrived at Christchurch 9 days later. One of them participated in the first fly-in to McMurdo, but the other remained in New Zealand until 22 November for correction of some mechanical difficulties. In fact, these aircraft required a considerable amount of maintenance throughout the season. Much of this would have been unnecessary if the rework facility that overhauled them had done its job properly. For example, in one of the planes the heater ducting was misrouted and the valves had been put in backwards. This situation contrasted markedly with the maintenance record of the one R4D-6 and the three R4D-5s: only one engine change was required during the season. Otherwise, they operated from one periodic check to the next with no outstanding discrepancies. As the squadron's report remarked, "These aircraft are aging but appear to grow old gracefully."

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[1] It will be remembered that the previous year's station in the vicinity of Liv Glacier was designated Beardmore-Scott Base; this cross-naming is one of Antarctica's little mysteries.

The three R4D-5s operated out of Little America, while the R4D-6 was at McMurdo Station from 18 October 1957 to 24 January 1958. The R4D-8 that arrived on 1 October remained at McMurdo until 29 November, seven days after its companion flew in from New Zealand. Then it shifted to Little America V in a flight that ended its active participation for the season. Bearing Admiral Dufek and a party that included two newspapermen, it approached Little America with its starboard ski jammed forward at an angle of 70°. The pilot began circling the field to use up as much fuel as possible before landing. This maneuver was cut short when the starboard engine caught fire. Having no choice, the pilot brought the plane in. It bounced once; then the jammed ski caught, and the aircraft pivoted to the right, coming to rest on the port ski and the starboard wing. Crew and passengers tumbled out, "Shaken up only mentally" as a pressman reported, and put out the fire with hand-held extinguishers before the Little America crash crew could get there. Owing to a lack of parts for the landing gear, the damage was not repaired until 8 February, after which the aircraft was flown to McMurdo Station and then to Christchurch.

The second R4D-8 remained based at McMurdo Station until 31 December, after which date it was sent to Little America and then to Byrd Station. Available reports make it difficult to distinguish the activities of this airplane from those of the other VX-6 aircraft, except for one incident. On 21 January 1958, while on a flight from Byrd Station to the South Pole, an oil leak developed in one of the engines. The pilot decided to make a precautionary landing on the Hollick-Kenyon Plateau to investigate the cause of the trouble. On the slide out, the port landing gear collapsed, and the plane came to rest on the port wing tip. A maintenance crew with parts and tools was hastily loaded aboard an R4D-5 at Little America and flown to the scene of the accident. Within 20 hours both aircraft were back at Little America.

The VX-6 report for *Deep Freeze III* unfortunately does not break down statistics of hours flown, cargo delivered, and passengers carried by aircraft category. It is, therefore, impossible to determine what share the Dakotas played in the total effort. Probably, it was relatively less than the previous year because VX-6 had available four ski-equipped Neptunes through much of the season. Although one of them was inoperative from 26 October to 22 November awaiting an engine change at South Pole, the Neptunes did not experience the maintenance problems that occurred during *Deep Freeze II.* They operated, however, almost entirely from McMurdo Station and did little more than visit Little America. Operations from the latter station were dependent, as in the previous season, largely on Otters and R4Ds, particularly the three R4D-5s that were stationed there.

The types of missions performed were in general similar to those of the previous year. On 2 October, two R4D-5s flew to mile 380 on the Little America-Byrd Station trail with 1,650 gallons of diesel fuel. The crew found that they had to clear the bladder of 3 feet of accumulated snow before they could fill it. The supplying of this and other caches continued through the month until a spell of favorable weather between 27 and 31

October permitted an all-out push that resulted in the delivery of 6,600 gallons, completing the placement of fuel along the tractor trail.

A similar type of support was afforded scientific traverses studying the glaciology of Marie Byrd Land and the Ross Ice Shelf. In both cases, the aircraft flew reconaissance as well as supply missions. For the Marie Byrd Land traverse, the aircraft were temporarily based at Byrd Station. The pilots reported landing conditions on the Marie Byrd Land plateau as varying from excellent to unfavorable according to the nature of the sastrugi. The Ross Ice Shelf traverse received support from both Little America and McMurdo Stations. In his log, the traverse leader, Dr. Albert P. Crary, recorded 12 landings by R4D's with passengers and supplies.

The Dakotas also participated in the lift of cargo and passengers between McMurdo and Little America Stations and from those points to other stations. On 1 November 1957, one of them became the first aircraft to use the sea-ice runway at Hallett Station which had up to this time been regarded as suitable only for emergencies.

On 25 January 1958, rapidly deteriorating bay ice in McMurdo Sound caused Admiral Dufek to order the withdrawal of what VX-6 referred to as its "long-range aircraft." Included in this category were the two R4D-8s, which left McMurdo separately on 1 and 10 February ultimately to be flown back to the United States for overhaul and modification, especially to their ski assemblies. The R4D-5s and the R4D-6 remained in the Antarctic for another winter in the open.

While the Dakotas did not occupy the preeminent place in *Deep Freeze III* that they had in *Deep Freeze II,* they still continued to be regarded as the workhorses of VX-6, a role that they would continue to play during the following two seasons.

FOR A SPECIAL TEST

Apart from the mainstream of antarctic operations during *Deep Freeze III* was the testing of a new electronic positioning device by two C-47s under the auspices of Headquarters Command, U.S. Air Force. With Major James W. Lassiter, USAF, as project leader, the two aircraft flew to Ellsworth Station on the Filchner Ice Shelf by way of South America. Along the way, they stopped at Robert Island in the South Shetlands, which has a flat, mesa-like ice cap and where the Chilean Navy had laid down a cache of aviation gasoline. When they sought to reach Ellsworth Station from Robert Island, bad weather intervened. Spying Dolleman Island through a rift in the overcast, Major Lassiter elected to set down there. When the weather cleared, the remaining fuel was transferred into one of the two aircraft which proceeded to Ellsworth Station, leaving behind four men with the second plane. Although the return to Dolleman with aviation fuel was delayed by weather, the party on the island was in no danger as it had sufficient food and fuel for 90 days. On 4 December, the relief flight was made, and the two Dakotas returned safely to Ellsworth. During the remainder of the month, the Air Force men were busily engaged in checking out the positioning device. On two occasions, business was combined with assisting the station by delivering fuel to a scientific traverse party. When it came time to leave, Major Lassiter felt that one of his planes was in too poor condition for the flight back and the risk of a single aircraft making the journey was unacceptable. Consequently, he made arrangements with the Argentine Navy to have the icebreaker *General San Martín* remove both the Dakotas and the personnel.

DEEP FREEZE IV

For *Deep Freeze IV* (1958-1959), VX-6 was assigned either 20 or 21 ski-equipped aircraft:[1] 8 Otters, 4 Neptunes, 4 R4D-8s, and 3 or 4 R4D-5s, and 1 R4D-6. One Neptune crashed during a test flight and never made it to "the ice." On the journey across the Pacific, an R4D-8 lost an engine 500 miles out of Canton Island. For 6 hours, the aircraft struggled along on one engine, flying only a few feet above the surface. When it finally landed at Canton, all fuel tanks registered empty. Two new engines had to be flown out. Although the plane eventually continued on to New Zealand, it too, never reached the ice. Of the remaining Dakotas, two R4D-5s and two R4D-8s were stationed at Little America V, where they did yeoman service in flying personnel and equipment to Byrd Station. For short periods, they were also based at the latter station to support scientific traverses in Marie Byrd Land. One of the two R4D-5s, the *Que Sera Sera* that had made the first landing at the South Pole, was withdrawn from operation early in December and loaded aboard a ship for return to the United States and eventual transfer to the National Air Museum.

From McMurdo Station, VX-6 operated two Dakotas: an R4D-6 and an R4D-8. On its way from New Zealand to Antarctica at the beginning of the season, the latter aircraft, after having passed the point of safe return, was informed that McMurdo's runway had suddenly been shut down by weather. It choose the only alternative, Hallett Station, where a 9,000-foot strip had been marked out on sea ice, but which had no landing aids. Four U.S. Air Force Globemasters also found themselves blocked from returning to McMurdo after long airdrop missions. The pilot of the R4D-8 stationed his aircraft at the end of the Hallett runway and talked the Globemasters down to safe landings with less than an hour's fuel remaining in their tanks.

Operations of the Dakotas from McMurdo, like those from Little America, followed the pattern of previous seasons. It is perhaps worth noting that of seven landings made that season at the South Pole, four were by Dakotas and three by Neptunes. Otherwise, the aircraft engaged in cargo runs between McMurdo and Little America and out to the summer weather station on the Ross Ice Shelf; they also supported scientific parties, including a traverse on the Victoria Land plateau that ascended the Skelton Glacier and then went almost due west, returning by the same route. In support of this project, a depot, consisting of 49 barrels of automotive gasoline, 1,500 pounds of explosives, and 7 boxes of food rations was placed at the head of the Glacier. Two flights were made, while the traverse was on the Plateau, to deliver spare parts required to repair the traverse vehicles.

At the end of the season, the R4D-8s were flown back to the United States while the R4D-5 and the R4D-6 remained in the Antarctic.

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[1] This discrepancy arises from an irreconcilable difference between the reports of the C.O., VX-6, and the Commander, U.S. Naval Support Force, Antarctica. The plane unaccounted for was one of the R4D-5s that wintered over in Antarctica. It is a possibility that the aircraft was not put back in flying condition, but no available document confirms this hypothesis. Navy records in the Office of the Chief of Naval Operation (Op-511) merely show that one of the R4D-5s was stricken from the Navy list of aircraft in January 1959, but the cause is not given.

ON INTO THE LONG HAUL—THE SIXTIES

If the plans for the IGY's antarctic phase had been carried out as conceived in 1955, American researchers and the Navy would have packed up and gone home at the end of *Deep Freeze IV.* Instead, the scientists of many nations working in the Antarctic, including those of the United States, convinced their respective governments to continue the scientific investigation of the Antarctic indefinitely, and even to expand it into fields not covered by the IGY. Realizing that a long period of antarctic involvement lay ahead, the Navy shifted from roman numerals to the fiscal year to designate its support operations: what would have been *Deep Freeze V* became *Deep Freeze 60,* and, as Rear Admiral David M. Tyree, who relieved Admiral Dufek, remarked, "*Deep Freeze 60* was the start of the 'long haul' in Antarctica."

This change inevitably meant a review of existing accommodations, procedures, and equipment. The bases established in 1956 and 1957 were not intended to endure for a long period. Many items of equipment had been selected not because they were necessarily best suited to the task, but because they met the pragmatic test of being adequate and available. The R4D-5s (and the 6 model) fell into this category. They were also considered expendable. An illustration of this fact occurred on 15 September 1959, two weeks before the first of the longer-ranged planes returned to the Antarctic for *Deep Freeze 60.* Faced by a difficult surgical situation, the officer-in-charge at Hallett Station requested assistance, and the Commander, Antarctic Support Activities, responded by sending McMurdo Station's doctor, accompanied by a hospital corpsman qualified to administer ether. When the Dakota carrying the medics landed on the bay ice at Hallett Station, the starboard landing gear folded, and considerable damage was incurred. The patient fared well in the subsequent operation, but the plane that brought him aid was stricken from the Navy list as "uneconomical to repair in view of the age of the aircraft." That official annotation was a prosaic reminder that the venerable Gooney Bird was entering the twilight of obsolescence, but it was not ready quite yet to yield its place to newer type of aircraft.

As far as VX-6 was concerned, air operations during Deep Freeze 60 did not differ much from those of previous years. The responsibility for its share of resupplying inland stations largely rested upon its Dakotas, and 78 such flights were made during the season. They were also the principal support of scientific field parties. Of particular interest in this regard was an airborne traverse carried out between the Sentinel Range and the Horlick Mountains. At eight points, scientists were put down to take seismic soundings, make magnetic and gravity measurements, and collect geological specimens. While not as thorough as a surface traverse, this method allowed the rapid collection of scientific information over a wide area. Surface traverse parties were supported in Marie Byrd Land and on the Victoria Land plateau. This latter party, rather than proceeding west on the plateau, turned north and followed a route more or less parallel to the Transantarctic Mountains until it arrived at a point which an earlier French expedition had reached the previous season. From there, it was to proceed east with the expectation that it would descend to the coast in the vicinity of Hallett Station. On 9 November 1959, the day after the party arrived on the plateau, two R4Ds delivered fuel and supplies and returned a Navy photographer to McMurdo Station. On two occasions, the R4Ds dropped spare vehicle parts without landing. At the end of January, while on the eastward leg of their journey, the scientists spied the mountains. Air reconnaissance, however, revealed that there was not a negotiable route to the coast, and the traverse party, abandoning its Sno-cats, was picked up by a Dakota and flown back to McMurdo.

Towards the end of the summer, the Dakotas made nine flights to establish a cache at the head of the Skelton Glacier for a scheduled *Deep Freeze 61* traverse party. Instead of turning north, this group would go south over the plateau until it reached the South Pole Station. When successfully completed, there would be a line of seismic soundings and other glaciological observation from Dumont d'Urville, the French station on the coast to the South Pole itself. After the southern traverse got underway, the R4Ds were not needed to support flights, and their participation was limited to the establishment of this cache.

All in all, the six Gooney Birds flew 1,042 hours and carried 86 tons of cargo, 360 passengers, and 9,110 gallons of fuel. In addition to the plane that cracked up at Hallett in September, another was lost in a near whiteout[1] condition in the vicinity of Byrd Station. In neither instance were there any casualties or even serious injuries. Of the other ski-equipped planes, the three single-engine Otters—which, within their range limitation, performed services like those of the Dakotas—few 361 flight hours and carried 11 tons of cargo, 375 passengers, and 880 gallons of fuel. The two Neptunes, on the other hand, were used primarily for aerial photography and search and rescue. They flew 189 hours and carried 7.5 tons of cargo and 5,000 gallons of fuel, as well as 384 passengers, the last mostly on the Christchurch-McMurdo run. It is no wonder that a field party from the Army's Transporation Environmental Group reported that the R4D was the mainstay of antarctic operations.

It was expected, however, that it would be superseded the following season in its function of hauling cargo to inland stations, especially to South Pole and Byrd. The Air Force had devised skis for a medium cargo aircraft, the C-130A Hercules, which had been employed successfully in Greenland. The Navy had on order four of these planes of a slightly different model (C-130B, later redesignated LC-130F) with greater range and lift capacity and a redesigned ski-assembly. When late in *Deep Freeze 60,* a requirement developed for the delivery of 400 tons of building materials to the South Pole and Byrd; the Air Force sent a contingent of seven Hercules to the Antarctic. Between 25 January and 5 February, these aircraft demonstrated their ability, and it was impressive. It was evident that the delivery of cargo on the deck was far superior to the airdrop methods previously in use. Of course, there was no comparison between the carrying capacity of the Hercules and the Dakotas.

From his initial observations and what he could learn of the Air Force's Greenland experience, Admiral Tyree concluded that, while the ski-equipped Hercules would greatly improve the support of inland stations, the R4D would, "be needed for years to come for the support of scientific projects requiring landings on unprepared snow surfaces." He might have added that such projects were increasing in number and size with the introduction into the scientific program of biology and geology, both of which required extensive field work. The commanding officer of VX-6, Captain W. H. Munson, was more specific. He developed criteria that would have to be met as long as over-snow traverses continued to operate at considerable distances from established bases. He pointed out that the aircraft would have to be strengthened for landing on rough, unprepared surfaces, that they should have a high load capacity, sufficient range, and low fuel consumption, and finally, that they should be easy to maintain and of low initial cost. The Dakota was the only available aircraft that had most of these characteristics, and he recommended that plans should be made to overhaul and keep in service the R4D-8s currently assigned the squadron until an effective substitute was developed. He believed that the most likely replacement would be a turbine-powered helicopter.

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[1] A whiteout results when light reflected back and forth between the snow surface and an overcast sky becomes so diffused that no shadows exist and the horizon cannot be seen.

A CHANGE IN *DEEP FREEZE 61*

Beginning with Operation *Deep Freeze 61,* the Dakotas were assigned principally to the support of scientific field parties, although they did on occasion carry out other missions, such as cargo and personnel lifts to Hallett and the summer weather stations (of which there were then two), ice reconnaissance, and search and rescue missions. Logistic support of inland stations, the squadron's principal mission, was taken over by VX-6's new LC-130F Hercules. From the beginning, these aircraft proved in Admiral Tyree's words, "to be effective beyond all expectations," but on only one occasion were they used to support a field party. On 10 December 1960, two flights landed a University of Minnesota geological traverse party with its vehicles, supplies, and equipment in the vicinity of the Jones Mountains, about 1,400 miles from McMurdo Station. The Hercules were preceded by an R4D-8 from Byrd Station to select a suitable landing site, where the Dakota furnished weather information and acted as a navigational aid. This procedure was to become standard during succeeding years whenever a Hercules was used for support in the open field.

During *Deep Freeze 61,* VX-6 used three R4D-8s and one R4D-5. The latter was one of the veterans that had been continuously in the Antarctic since 1956. It, and one of the R4D-8s, operated from McMurdo Station, while the other two were sent to Byrd to support scientific field parties within a 600-mile radius. On 25 November 1960, an R4D-8 from Byrd, landing on a rough snow surface in the Horlick Mountains, suffered landing gear failure. It was later patched up in the field, but only sufficiently for it to limp back to Byrd and then to McMurdo, where it was loaded aboard ship and sent home. The R4D-8 at McMurdo was then sent to Byrd, where it remained for the rest of the season. Only one Dakota, an R4D-8, remained over the winter at McMurdo Station. The others were returned to the United States. Thus the last of the R4D-5s that had arrived on *Deep Freeze II* was withdrawn. Apparently, it was not worth refitting, for in May, it was stricken from the Navy list of aircraft.

The pilots who operated both types of Dakotas, the R4D-5 and -6 being considered as practically the same plane, preferred that model to the R4D-8. Its engines were more reliable, the aircraft was easier to maintain, and, because of its lower takeoff and landing speeds, less liable to damage when making open-field landings. They also pointed out that it consumed less fuel and that, although its weight-lifting ability was smaller than that of the R4D-8, it actually had a larger cubic capacity for cargo. The big advantage of the R4D-8 was its greater range, but with the advent of the Hercules for long hauls, the necessity for a smaller transport aircraft with a radius of action in excess of 600 miles had virtually ceased to exist. The commanding officer of VX-6 felt that the R4D-5 could replace both the R4D-8 and the Otter, and he recommended that, as the 8-model was phased out of antarctic service, it be replaced by R4D-5s.

DEEP FREEZE 62

This recommendation was not immediately carried out, and the squadron operated during *Deep Freeze 62* with three R4D-8s and a lone R4D-5. The R4D-8 that had spent the winter at McMurdo was reactivated at the start of the season. The other two and the R4D-5 made the long flight across the Pacific without incident. Once in the field these aircraft were used principally for traverse and field party support. As in past years, however, the Dakotas performed other functions such as supply flights to inland stations, setting out automatic weather stations, searching out landing sites for Hercules, flying weather probes in advance of photo-reconnaissance flights, ice reconnaissance, search and rescue, and taking photographs (hand-held obliques) for field parties.

Typical of the support given was that afforded to a University of Michigan glaciological team investigating the valley glaciers that feed the Ross Ice Shelf. During the early season, this group worked with a party from the University of Minnesota engaged in geophysical research. Two R4Ds from McMurdo placed the combined groups at the foot of the Nimrod Glacier on 30 October. Dr. Edward C. Thiel of the Minnesota party was picked up and flown back to McMurdo on 4 November, so that he might carry out an airborne magnetometer survey. (He subsequently died in the crash of a Neptune at Wilkes Station.) The remainder of the party completed a 174-mile journey to the vicinity of the Beardmore Glacier, doing scientific work along the way. On 7 December, a Dakota picked up the 3-man Michigan party and moved it to a spot 30 miles to the north of Amundsen Glacier. There, the scientists were left with two motor toboggans, fuel for 300 miles, food for 6 weeks, and their camping, glaciological, and surveying equipment. On 4 January, when the party had not been heard from for 10 days, "owing," according to the leader, "to a misunderstanding about radio messages," an aircraft came out from McMurdo looking for it, landed alongside, and made certain that all was well. The party continued its investigations, visited the original Beardmore Camp (near Liv Glacier) that had been established during Deep Freeze II, and "liberated" some of the food left there 5 years previously. From there they were picked up and returned to McMurdo Station.

A new type of traverse—one that was to grow in importance with the years—was conducted this season. To support a topographic survey by the U.S. Geological Survey, the Army sent two turbine-powered helicopters to the Antarctic. These machines had the advantage of being able to place topographic engineers at high altitudes in the mountains. They had, however, only relatively short range, and were in practice limited to their principal function of supporting a survey party. Fuel caches were laid out, supplies brought in, and campsites moved by the aircraft of VX-6, including the Dakotas, which laid fuel caches between McMurdo Sound and Beardmore Glacier to the south, and McMurdo Sound and Hallett Station to the north.

During the season, the four Dakotas flew 980 hours, carried 450 passengers, and delivered 183 tons of cargo. But all this was not done without mishaps, at least one of which did not get into the report of VX-6's commanding officer: on landing beside a heavy tractor traverse, carrying supplies and equipment salvaged from the former Little America V to Byrd Station, an R4D-8 lost its tail wheel. Those on the ground simply hoisted the plane's tail section with the boom of a D-8 tractor, put in a new pin, and the aircraft was ready to go.

More serious were two accidents that occurred to aircraft operating form Byrd Station. An R4D-8, landing a University of Michigan geological party in the Horlick Mountains, on 12 November, had a pin shear in the port landing gear. It was the same aircraft that had suffered a similar accident in the same area the year before. This time, the results were not so fortunate. It was determined that damage was sufficient and the location so remote as to make repairs unfeasible, and the plane was abandoned. (The geological party later returned to the area and, during a storm, took refuge for 5 days in the derelict fuselage, a use never intended by the manufacturer.) The other accident occurred on 1 February at Byrd Station—the JATO bottles failed to ignite after an R4D-8 had already retracted its landing gear, causing an unscheduled belly landing. While the plane was repairable, the accident occurred so late in the season that it was decided to let it rest where it lay until *Deep Freeze 63.* It was eventually fixed up and flown to McMurdo Station, where it was loaded aboard ship and sent to New Zealand for repairs.

In looking back over his season's experience, the commanding officer of VX-6, Commander M. D. Greenwell, pointed out that handling cargo in and out of a Dakota was difficult, as was refueling with handpumps and that extensive preheating was required to get the aircraft started, and he, like his predecessor, preferred the R4D-5, to the R4D-8. All these were, however, comparatively minor matters when compared to the all-around usefulness of this type of aircraft, about which Commander Greenwell expressed himself eloquently:

> *The R4D has again proven herself a valuable friend and the "Grand Old Lady" of Antarctic Operations. She is economical and durable, and her versatility in short range, open field ski operations remains undisputed. It is not difficult to foresee the day, perhaps in the near future, when an equally versatile, longer-range, greater-payload, higher-flying turboprop replaces the old warrior, but until that day comes, treat her kindly, keep her warm, push the right JATO buttons, and navigate clear of all obstacles.*

Although VX-6 was to continue to employ Dakotas in the Antarctic until December 1967, Commander Greenwell's statement had something of a valedictory about it.

DEEP FREEZE 63—A NEW NAME FOR THE DECLINING YEARS

During *Deep Freeze 63,* the Navy adopted the Air Force's system of aircraft designation; the R4D-5 and -6 became the C-47, and the R4D-8 became the C-117. When equipped for cold weather operations, which usually meant skis, the prefix "L" was added. That a growing disenchantment with the DC-3 type planes began about the time this change occurred was purely a coincidence, but it is true that the LC-47 and LC-117 never exercised the charisma of the R4Ds.

More to the point was the experience of *Deep Freeze 63.* Performing the same type of missions as in previous years, the Dakotas flew 1,319 hours on 260 flights, carried 452 passengers, and delivered 159 tons of cargo. At the beginning of the season, however, only two of an inventory of four planes were operable. An LC-117 was lying on its belly at Byrd Station awaiting temporary repairs so that it could be flown to McMurdo and be loaded aboard ship. An LC-47, which had wintered over at McMurdo, had been damaged by a late winter storm and awaited spare parts. During three days in November 1962, an LC-117 and an LC-47 were lost in the field: the first on landing in the Sentinel Range; the second while taking off from the Davis Glacier. More aircraft were acquired during the season so that, despite the losses, VX-6 ended the operations with one LC-117 and three LC-47s, all of which were left in the Antarctic for the winter.

The commanding officer of VX-6, Commander W. H. Everett, commented that the Dakota was the best aircraft available for medium-range logistic support. Because of the nature of its mission, it was the type most often called upon to make open-field landings and was, therefore, the most susceptible to damage. This susceptibility was compounded by the fact that replacement aircraft could only be drawn from the "mothball" reserve and, when received by the squadron, already had up to 20 years of flying and thousands of hours on their airframes. He recommended that a light- to medium-weight transport aircraft be obtained as a replacement.

Rear Admiral James R. Reedy, who, in November 1962, had relieved Admiral Tyree as Commander, U.S. Naval Support Force, Antarctica, was much more outspoken. At one point in his report, he recommended that the Dakotas, Otters, and H-34 helicopters being operated by VX-6 all be replaced by turbine-powered helicopters. At another, he advocated replacement of the LC-47/LC-117 by VTOL or STOL aircraft "as soon as possible," and predicted that the loss of one or two Gooney Birds could be expected each season.

Nothing in the seven years that the aircraft had flown in the Antarctic seemed to warrant this gloomy prediction. True, five Dakotas had been lost, but without death or even serious injury to the occupants, and of these five losses, two had occurred during *Deep Freeze 60,* two during *Deep Freeze 63,* and one during *Deep Freeze 62.* Although the other four seasons were not accident-free, it had been possible in all cases to repair the planes and put them back into service. This more optimistic analysis seemed to be borne out by the events of *Deep Freeze 64,* when six Dakotas (five LC-47s and one LC-117) flew 248 flights for a total of 1,190 hours and carried 458 passengers and 142 tons of cargo without a significant accident.

At the end of the season, however, Admiral Reedy renewed his plea for long-range, turbine-powered helicopters. The commanding officer of VX-6, Commander R. G. Kelly, included with his report a thoughtful analysis of the problem of air support for scientific field parties and traverses. Scientific activities, he said, were being conducted at ever increasing distances from established stations and frequently at high altitudes. The number of participants was growing, and equipment and supplies were needed in greater quantity. Operations in the Pensacola Mountains during *Deep Freeze 64* had been at the extreme range of the LC-47s, and nearly at that of the LC-117, and the loads required had made these aircraft almost a detriment to efficient field support. These developments pointed to the superiority of the turbo-prop Hercules. Furthermore, the redesigned ski-landing gear of the Navy model had proved superior to that of the earlier Air Force model and made it possible to lift many of the restrictions placed by the Air Force on the Hercules as a result of its Greenland operations. Experience had shown that the Hercules could land wherever a Dakota could, and that the assumptions upon which Admiral Tyree's conclusion of 1961 had been based were no longer valid. Commander Kelly, however, felt that certain precautions should continue to be taken when open-field operations in unfamiliar terrain were conducted. Among these he considered a preliminary landing by a Dakota as a prerequisite. Presumably, he was influenced by the cost of replacing a Hercules, although he didn't specifically say so. As an illustration of the perils of flying Dakotas, he painted a picture of an early season operation that he said had been typical of LC-47/LC-117 activities during *Deep Freeze 64:*

> *Heavily loaded, forced to fly at maximum ceiling over extremely rugged mountainous terrain, fighting to stay clear of cloud-shrouded peaks and whiteout areas, the reliable, ancient Douglas aircraft carried out their mission and returned to McMurdo.*

DECLINE OF THE DAKOTA: LC-117 and LC-130F (Hercules) support scientific field party, 7 Nov. 1962.

Yet, in his way, Admiral Reedy had been prophetic. Two LC-47s were lost during *Deep Freeze 65,* and two more suffered unrepairable damage in the first part of *Deep Freeze 66.* Two of these accidents involved the collapse of landing gear when making open-field landings in the Horlick Mountains. A third accident occurred when a JATO bottle exploded on takeoff from Lillie Glacier and struck a propeller. The fourth happened only three miles from Williams Field on a practice touch-and-go landing and was caused by faulty rigging of a ski-cable fitting.

RECONSIDERED ROLE

These accidents caused a reexamination of the role of the Dakota by both the commanding officer of VX-6, Commander M. E. Morris, and the Commander, U.S. Naval Support Force, Antarctica, Rear Admiral F. E. Bakutis. The latter pointed out that the hazards of landing and takeoff on unprepared snow surfaces had reached unacceptable levels. On the other hand, five years' experience had shown that the heavier, more rugged Hercules could be operated under open-field conditions with a greater margin of safety.

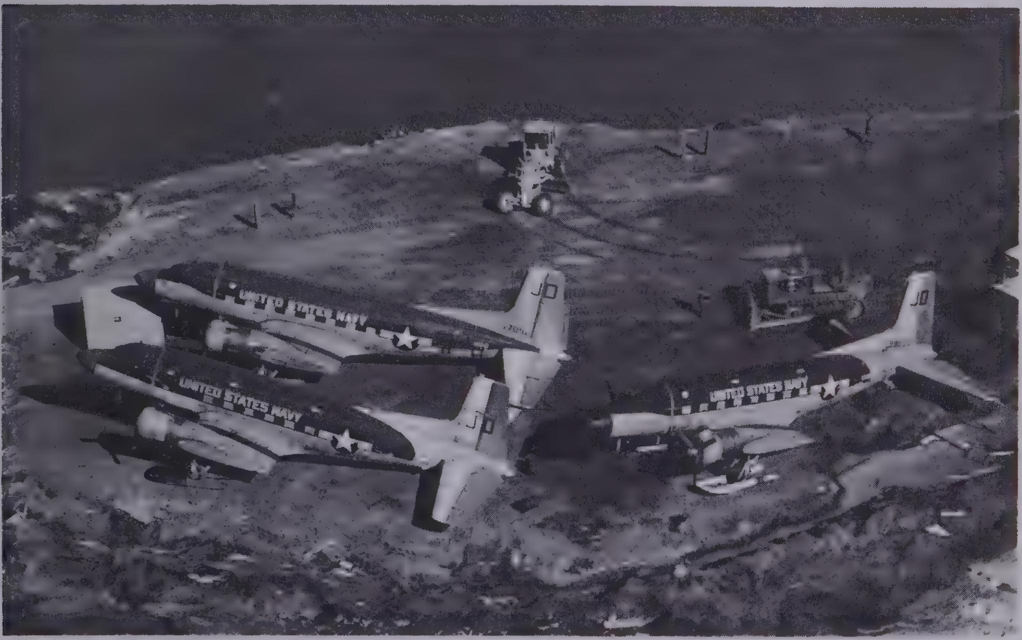
Commander Morris, for his part, noted that maintenance was becoming increasingly difficult because spare parts were frequently unavailable and had to be obtained either by cannibalizing other aircraft or by fabricating them at the squadron level. Except when in need of overhaul, the aircraft were usually left in the Antarctic for the winter, which meant that they were not available for training purposes or to help fulfill the squadron's commitments when it was not under the operational control of the Commander, U.S. Naval Support Force, Antarctica. Even when they were returned to the United States for overhaul, the process took so long a period that they were received barely in time to make the flight back to Antarctica. As a result, the squadron had to borrow DC-3 type planes for training purposes, and, as these were rarely equipped with skis, the training was not very realistic. Commander Morris concluded that, "it is no longer safe to operate in Antarctica with the airplane." The Commander, U.S. Naval Support Force, Antarctica, did not agree, but did state that the LC-47/LC-117 had limited capabilities which must be recognized and respected.

The result of all this discussion was that the Dakotas would operate only from established skiways or in areas where the surface condition was known to be safe. Most support of scientific parties in the field would be assumed by the Hercules. Because of the added function being given these aircraft, an effort would be made to obtain one or more new Hercules. In the meantime, the Dakotas in the VX-6 inventory would be retained and the possibility of having them overhauled in New Zealand, as had been done on one previous occasion, investigated. Those that had been lost would not be replaced.

The limitation on landing areas did not, however, prevent the occurrence of the single fatal accident in which a *Deep Freeze* Dakota was ever involved. On 2 February 1966, an LC-117 and an LC-47 flew out from McMurdo to mile 60 on the trail from Little America to Byrd Station. They were to pick up a scientific party there and move it to mile 120 on the same trail. The LC-117 landed safety under conditions of poor visibility and some icing. As the LC-47 approached the landing area, it appeared to stall to the right, then briefly to resume level flight before stalling sharply to the left and plunging to the surface. Before rescuers could arrive, fire broke out and subsequently ignited the JATO bottles aboard the aircraft. More than 6 hours elapsed before the wreckage could be approached. All six crew members died probably upon impact; no evidence could be found that any had tried to escape.

No doubt this catastrophe further decreased the use of the Dakotas, but their removal from most field party support had already deprived them of their principal function. During *Deep Freeze 65,* the season before the restrictions went into effect, four LC-47s and one LC-117 flew 850 hours and delivered 99 tons of cargo. In *Deep Freeze 66,* with the limitations in effect from mid-season, the number of flight hours declined to 763 and cargo figure dropped to 22 tons. The full effect of the changed rules was felt during *Deep Freeze 67,* when the three LC-117s operating in Antarctica[1] made 30 flights for a total of 172 flight hours, carried 94 passengers, and delivered 20 tons of cargo. Almost all the cargo flights were made between McMurdo and Hallett Stations.

Deep Freeze 67 was virtually the last season of antarctic operations for the Dakotas. In fact, their end had been signalled in December 1966. In justifying the purchase of another Hercules, the Commander, U.S. Naval Support Force, Antarctica pointed not only to the increased safety but also to the savings in personnel and hence in expenditure, that would occur if the Dakotas were removed from the program. When the purchase of the Hercules was approved, the days of the ancient aircraft were numbered.



END OF THE ROAD: Dakotas (LC-117s) stripped of wings, awaiting shipment to the United States, Jan. 1968.

During *Deep Freeze 68,* only one of the three Dakotas was put into operation. This aircraft made 25 flights and flew 86 hours. Three of these flights were to support scientific field parties, and four were cargo runs to Hallett. One of the latter, made on 2 December 1967, was the last flight of a United States Dakotas in the Antarctic. By the end of the year, the three planes were being dismantled and prepared for shipment. As they were being loaded aboard USNS *Pvt. John R. Towle* in January, one of them, Bureau number 99853, slipped from the sling and was so badly damaged that it was abandoned. It was unfortunate because this aircraft was a 10-year veteran, having first reached McMurdo on 1 October 1957. Old 99853 did not give up easily, however. Pushed out on the ice of McMurdo Sound, to drift away and sink, it was still there a year later, plainly visible from the station.

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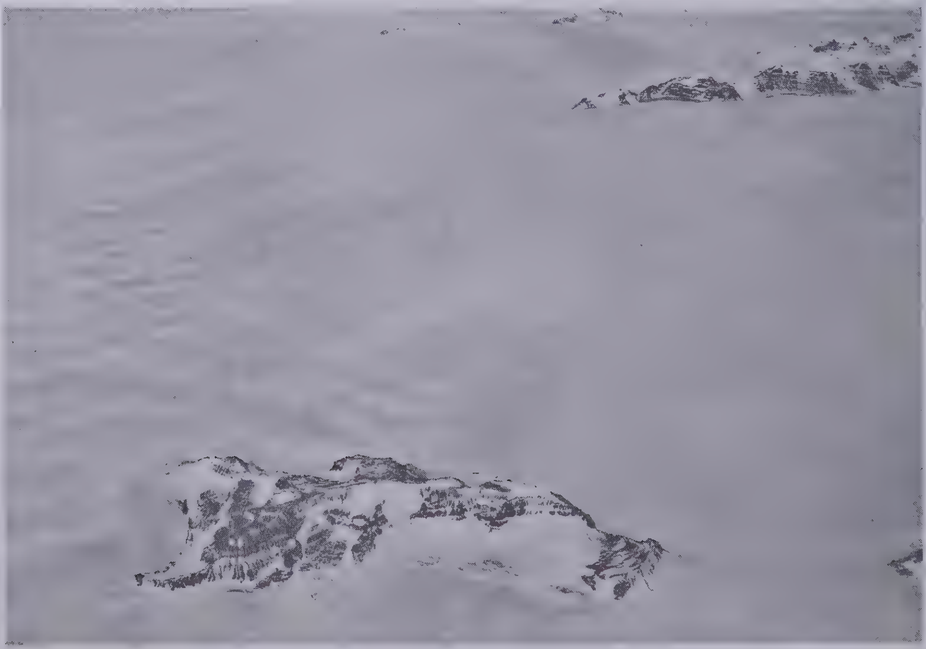
[1] An LC-47 was retained in the squadron complement but was used exclusively in New Zealand for administrative flights.

More durable as monuments to the accomplishments of the antarctic Dakotas will be the two that have been given to museums. *Que Será Será,* the first plane to land at the South Pole, is now in the custody of the National Air Museum. When that organization obtains suitable quarters, it will presumably be put on public display. The LC-47 that was stationed in New Zealand continued to operate locally through *Deep Freeze 69*, until on 18 April 1969, it was presented to the Ferrymead Museum of Science and Industry at Christchurch.

In Antarctica itself, many a geographic feature bears the name of a brave pilot or hardy crewman, frequently proposed by a scientist or other recipient of their services. The gratefulness of some of the beneficiaries extended to the airplane itself, and on the map of the Antarctic may be found Dakota Pass, R4D Nunatak, and Skytrain Ice Rise to commemorate, as long as men go to the Antarctic to study its topography, the great contribution that the venerable Gooney Bird made to the first decade of *Operation Deep Freeze.* Obviously, the ambitious program of the International Geophysical Year could not have been successfully completed without it. Until the Hercules was added to the inventory of VX-6, the DC-3, by whatever name one choses to call it, was the principal means of transport within the confines of Antarctica. During those early years, despite its limitations, the Dakotas gave to the United States program a flexibility and scope never before achieved in the area. One can only end a review of their accomplishments by awarding them the tested Navy accolade of "Well Done."



IN PERPETUITY: R4D Nunatak located at 72°44′S., 162°21′E.

APPENDIX A

AIRCRAFT SPECIFICATIONS

AIRPLANES	LC-47	LC-117
Wingspan	95′0″	90′0″
Height	17′	18′3″
Length	63′3″	67′9″
Maximum Gross Weight (pounds)	30,140	36,380
Average Range (miles)	1,200	1,400
Average Payload (pounds)	10,000	12,000
Passengers	27	33
Fuel Consumption (gal/hr)	100	125
Fuel Capacity (gallons)	1,600	1,900
Maximum Cruising Speed (MPH)	221	260
Crew	5	5
Engines	2	2
Manufacturer	Pratt & Whitney	Wright
Type	Reciprocating	Reciprocating
Rated Horsepower	1,200	1,475
Cargo Compartment (cu ft)	980	980
Maximum size of single cargo unit	7′ X 4′7″ X 10′	7′ X 4′7″ X 10′

APPENDIX B

A NOTE ON ARGENTINE DC-3 OPERATIONS

Both the Argentine Air Force and Navy have flown DC-3 aircraft in the Antarctic. As early as 1954, the Air Force created an Antarctic Air Task Force that, among other aircraft, employed Dakotas to fly weather reconnaissance missions between its Rio Gallegos Air Base in Southern Patagonia and the Antarctic.

During the 1961-1962 season, the Navy flew two DC-3s to the South Pole by way of a temporary base camp on the Larsen Ice Shelf and Ellsworth Station. They arrived on January 7, 1962 and, after a stay of a few hours at Amundsen-Scott South Pole Station began their return flight. Fuel, JATO bottles, and maintenance support at the South Pole was provided by the U.S. Navy.

The following season an Argentine Air Force DC-3 attempted to duplicate this feat, but the aircraft caught fire on take-off from Ellsworth and was a total loss. Fortunately, the crew escaped without injury. The Air Force was successful, however, in establishing regular cargo and personnel flights between Rio Gallegos and Teniente Matienzo Station also located on the Larsen Ice Shelf in the vicinity of Robertson Island.

The Air Force did not relinquish its ambition to reach the South Pole with the accident of 1962. In October 1965, it launched another and successful attempt to make the flight, using a DC-3 and two single-engine Beavers. The DC-3 was especially modified for the purpose. The normal engines were replaced by DC-4 engines and a jet propulsion unit with a 600 kilogram thrust installed in the tail. The route followed was basically the same as that used by the Navy in 1962. From Rio Gallegos the plane flew to Teniente Matienzo then on to General Belgrano Station on the Filchner Ice Shelf. In company with the two Beavers, the DC-3 laid down an emergency cache at 83° South Latitude, from which point they proceeded to the South Pole, arriving 3 November 1965. A few days later, the DC-3 continued on to McMurdo Station, thus completing the crossing of the continent. As for the Argentine Navy flight of 1961-1962, the U.S. Navy furnished gaosline, JATO, and other support. After a period for maintenance at McMurdo Station, the DC-3 commenced its return flight. As it flew over the South Pole, the two beavers rose to join it. The homeward journey was uneventful.

During 1967, the Air Force sent three DC-3s to Teniente Matienzo. While there, the aircraft carried on a number of activities resembling those performed by United States Dakotas on the other side of the Antarctic. They flew photo-reconnaissance missions, supplied shelters and other outlying camps, and carried fuel, supplies, and passengers. One of these aircraft visited the Argentine Eperanza Station at Hope Bay. Transport operations between Rio Gallegos and Teniente Matienzo have continued.

APPENDIX C

A NOTE ON SOVIET TWIN-ENGINE AIRCRAFT, LI-2

The Soviets have submitted to the SCAR Logistics Working Group the specifications and performance data for three twin-engine aircraft that they have used in the Antarctic: the IL-14, IL-12, and LI-2. Of these three, the LI-2 has characteristics and performance quite similar to that of the LC-47/LC-117. In appearance, it resembles the LC-47. (The IL-14 and IL-12, which appear to be different versions of the same basic aircraft are larger and more powerful than the LI-2 and have tricycle landing gear.)

The Soviets also prepared a summary of air operations for the Logistics Working Group. While this document contains discrepancies, some of which may be the result of poor translation, it does provide a generally informative review of Soviet employment of aircraft. Just as the United States had depended heavily on C-47s in the years from 1956 through 1961 so did the Soviets rely upon the LI-2. Unlike the United States and Argentina, they transported the aircraft to Antarctica by ship rather than fly them in. The first expedition (1955-1956) took two LI-2s to Mirnyy Station. The following season, they had 6 and by early 1958 there were 7. From this peak, there occurred a gradual decline: 4 in 1959 and 1960; 3 in 1961, and apparently 1 in 1962, although the report is not clear in this point. In 1964, however, there were 2: one at Mirnyy and the other at Molodezhnaya. At least one LI-2 continued in use through the 1966-1967 season.

The manner in which the Soviets employed these aircraft was quite similar to that of the United States in using the LC-47 and LC-117. One of their first activities on reaching Mirnyy was to make a reconnaissance flight to the east. Shortly thereafter, they participated in establishing a scientific party in the Bunger Hills. During July 1956, the two LI-2s then at Mirnyy, along with an IL-12 and a single-engine AN-2, delivered 14 men and 12 tons of cargo to Pionerskaya Station located on the polar plateau. The same aircraft during August and September transported the personnel and equipment to establish a scientific party in the Bunger Hills. The LI-2s carried out a seismic sounding of Drygalski Island and also landed scientists to make astrofixes at various points. At other times they supported scientific and other traverses. Some of these aircraft appear to have been specially equipped for various types of scientific investigation. One use for these aircraft that has no counterpart in the United States experience with fixed wing aircraft in the Antarctic was the ferrying ashore both passengers and cargo from ships unable to penetrate the pack ice. For example, in 1966, approximately 32 tons of goods and 93 passengers were shuttled back and forth between Mirnyy and the expedition ship.

The short summary of air operations does not indicate any conclusions that the Soviets may have drawn from their experience with LI-2s, nor does it indicate why they were phased out of the program. Presumably, it was because of the greater capabilities of the IL-12 and IL-14 aircraft. Their missions, however, seem similar to those performed for *Operation Deep Freeze* by the LC-47s and LC-117s.

SOURCES

OPERATION HIGHJUMP

Commander Task Force SIXTY EIGHT (Rear Admiral Richard H. Cruzen, USN) *Report of Antarctic Developments Project,* 1947, *(Operation Highjump).*

Walter Sullivan, "Byrd Lands in Little America," *N.Y. Times,* reprinted in *The Polar Times,* No. 24, June 1947, p. 11.

R. E. Byrd, "Our Navy Explores Antarctica," *The National Geographic Magazine,* Vol. XCII, No. 4, (October 1947), pp. 429-522.

John Grierson, *Challenge to the Poles,* Hamden, Conn., Anchor Press, 1964. pp. 557-561.

SECOND ANTARCTIC DEVELOPMENTS PROJECT

L. O. Smith, *"Operation Windmill," The Second Antarctic Developments Project, Antarctic Journal of the United States,* Vol. III, pp. 23-36.

OPERATION DEEP FREEZE I

Commander, U.S. Naval Support Force, Antarctica/Commander, Task Force FORTY-THREE (Rear Admiral G. J. Dufek, USN), *Report of Operation DEEP FREEZE I.*

G. J. Dufek, *Operation Deepfreeze,* New York, Harcourt, Bruce, and World, 1957, pp. 83-85.

OPERATION DEEP FREEZE II

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral G. J. Dufek, USN), *Report of Operation DEEP FREEZE II.*

Commanding Officer, Air Development Squadron Six (VX-6), (Captain D. L. Cordiner, USN), *Report of Operation DEEP FREEZE II.*

Officer in Charge, Little America V, (LCDR R. E. Graham, USN), *Report of Air Operations at Little America V, Operation DEEP FREEZE II from 25 October 1956 to 9 January 1957.*

Commanding Officer, U.S. Naval Construction Battalion (Special) and Officer in Charge, U.S. Naval Construction Battalion (Special), Detachment ONE, (Commander H. W. Whitney, CEC, USN), *Operational Reports for Operation DEEP FREEZE I and that portion of Operation DEEP FREEZE II included in the period of February 1955 through 18 January 1957;* Vol. V, Annex D, Part Four, (Beardmore-Scott Auxiliary Air Base); Part Five (Air Operations): Vol. VI, Annex E (South Pole Station).

Commanding Officer, U.S. Naval Construction Battalion (Special), (Commander W. F. Flynn, CEC, USN), *Technical Reports for Operation DEEP FREEZE II.* Vol. IV, Byrd Station, Antarctica; Vol. VI, South Pole Station.

Air Force Task Unit (Colonel H. A. Crosswell, USAF), *Narrative Summary Report, DEEP FREEZE II.*

Commander, U.S. Naval Support Force, Antarctica, (prepared by LT. P. M. Smith, USA), *Army-Navy Trail Party Report, 1956.*

A. E. Anthony, Jr., *The Air Force in Antarctica: The First Decade, 1947-1957,* pp. 94-95. ms.

G. J. Dufek, *Operation Deepfreeze* (See p. 26), pp. 193-210.

Paul A. Siple, *90° South,* New York, G. P. Putman's Sons, 1959, p. 144.

Walter Sullivan, "Antarctic Flight Lands at Pole," *N.Y. Times,* reprinted in *The Polar Times,* No. 43, December 1956, p. 10.

H. M. Dater, "Amundsen-Scott South Pole Station," *Antarctic,* Vol. 5, pp. 94-98.

OPERATION DEEP FREEZE III

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral G. J. Dufek, USN), *Report of Operation DEEP FREEZE III.*

Commanding Officer, Air Development Squadron Six (VX-6), (Captain R. J. Slagle, USN), *Report of Operation DEEP FREEZE III.*

Air Development Squadron Six (VX-6), *VX-6, The Navy's Antarctic Air Squadron, a History,* n.d. [A running chronology rather than a history; concludes with DEEP FREEZE 65.]

The Polar Times, December 1957, June 1958.

A. E. Anthony, Jr., (See above).

A. P. Crary, E. S. Robinson, H. F. Bennett, W. W. Boyd, Jr., *Glaciological Studies of the Ross Ice Shelf, Antarctica, 1957-1960,* IGY Glaciological Report, No. 6, May 1962.

OPERATION DEEP FREEZE IV

Commander, U.S. Naval Support Force, Antarctica, (Rear Admiral G. J. Dufek, USN), *Report of Operation DEEP FREEZE IV.*

Commanding Officer, Air Development Squadron Six (VX-6), (Captain R. J. Slagle, USN), *Report of Operation DEEP FREEZE IV.*

Officer in Charge, Byrd Station, (LT, E. J. Galla (MC), USNR), BYRD STATION LOG: DEEP FREEZE IV, ms.

The Polar Times, December 1958, June 1959.

Air Development Squadron Six (VX-6), *VX-6, The Navy's Antarctic Air Squadron, a History,* n.d.

H. M. Dater, "Hallett Station—From Idea through the IGY," *Bulletin of the U.S. Antarctic Projects Officer,* Vol. VI, No. 5, p. 30.

A. P. Crary, *Results of United States Traverses in East Antarctica, 1958-1961,* IGY Glaciological Report No. 7, December 1963.

OPERATION DEEP FREEZE 60

Commander, U.S. Naval Support Force, Antarctica, (Rear Admiral David M. Tyree, USN), *Report of Operation DEEP FREEZE 60.*

Commanding Officer, Air Development Squadron Six (VX-6), (Captain W. H. Munson, USN), *Report of Operation DEEP FREEZE 60.*

Air Development Squadron Six (VX-6), *VX-6, The Navy's Antarctic Air Squadron, a History,* n.d.

Transportation Environmental Operations Group, U.S. Army, *After Action Report: Antarctica, 1959-1960.*

Commander, 61st Troop Carrier Squadron (Medium), (Lieutenant Colonel Wilbert Turk, USAF), *Mission Report: Operation "Ice Floe."*

H. M. Dater, *Aviation in the Antarctic,* rev. June 1965.

A. P. Crary, *Results of United States Traverses in East Antarctica, 1958-1961,* (see p. 27).

OPERATION DEEP FREEZE 61

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral David M. Tyree, USN), *Report of Operation DEEP FREEZE 61.*

Commanding Officer, Air Development Squadron Six (VX-6), (Captain W. H. Munson, USN), *Report of Operation DEEP FREEZE 61.*

Air Development Squadron Six (VX-6), *VX-6, The Navy's Antarctic Air Squadron, a History,* n.d.

A. P. Crary, *Results of United States Traverses in East Antarctica, 1958-1961* (see above).

OPERATION DEEP FREEZE 62

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral David M. Tyree, USN), *Report of Operation DEEP FREEZE 62.*

Commander Task Group FORTY-THREE POINT TWO (CO AIRDEVRON SIX) (Commander M. D. Greenwell, USN), *Operation Order No. 1-61.*

Commanding Officer, Air Development Squadron Six (VX-6), (Commander M. D. Greenwell, USN), *Report of Operation DEEP FREEZE 62.*

M. D. Greenwell, *U.S. Air Operations in Antarctica,* ms.

C. W. M. Swithinbank, "University of Michigan Glaciological Work on the Ross Ice Shelf, 1961-1962." *Bulletin of the U.S. Antarctic Projects Officer,* Vol. III, No. 8, pp. 2-6.

W. E. Martin, "Little America-Byrd Traverse," *Bulletin of the U.S. Antarctic Projects Officer,* Vol. III, No. 8, pp. 6-16.

P. G. Schmidt, "Geological Reconnaissance of the Ellsworth Mountains," *Bulletin of the U.S. Antarctic Projects Officer,* Vol. III, No. 8, pp. 17-20.

OPERATION DEEP FREEZE 63

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral James R. Reedy, USN), *Report of Operation DEEP FREEZE 63.*

Commanding Officer, Air Development Squadron Six (VX-6), (Commander W. Everett, USN), *Report of Operation DEEP FREEZE 63.*

OPERATION DEEP FREEZE 64

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral James R. Reedy, USN), *Report of Operation DEEP FREEZE 64.*

Commanding Officer, Air Development Squadron Six (VX-6), (Commander G. R. Kelly, USN), *Report of Operation DEEP FREEZE 64.*

OPERATION DEEP FREEZE 65

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral James R. Reedy, USN), *Report of Operation DEEP FREEZE 65.*

Commanding Officer, Air Development Squadron Six (VX-6), (Commander F. S. Gallup, USN), *Report of Operation DEEP FREEZE 65.*

OPERATION DEEP FREEZE 66

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral Fred E. Bakutis, USN), *Report of Operation DEEP FREEZE 66.*

Commanding Officer, Air Development Squadron Six (VX-6), (Commander M. E. Morris, USN), *DEEP FREEZE 66 End of Season Report.*

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral Fred E. Bakutis, USN), Second Endorsement on VX-6 Serial 3-65A, concerning LC-47H, BUNO 17107 accident occuring 5 December 1965.

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral Fred E. Bakutis, USN), MEMORANDUM FOR THE RECORD: Aircraft for DEEP FREEZE, 24 January 1966.

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral Fred E. Bakutis, USN), FIRST ENDORSEMENT on VX-6 Ltr Ser. 1070 of 16 Dec 1965, 25 Jan 1966.

Commanding Officer, Air Development Squadron Six (VX-6), Commander M. E. Morris, USN), Replacement of LC-47/117 Aircraft assigned to Operation DEEP FREEZE; request for. (Two rough drafts of this letter exist; the final version has not been found.)

"Aircraft Accident Takes the Lives of Six Navy Men," *Antarctic Journal of the United States,* Vol. I, No. 2, p. 39.

OPERATION DEEP FREEZE 67

Commander, U.S. Naval Support, Antarctica (Rear Admiral J. Lloyd Abbot, Jr., USN), *Report of Operation DEEP FREEZE 67.*

Commanding Officer, Air Development Squadron Six (VX-6), (Commander D. Balish, USN), *DEEP FREEZE 67 End of Season Report.*

OPERATION DEEP FREEZE 68

Commander, U.S. Naval Support Force, Antarctica (Rear Admiral J. Lloyd Abbot, Jr., USN), *Report of Operation DEEP FREEZE 68.*

Commanding Officer, Air Development Squadron Six (VX-6), (Commander A. F. Schnieder, USN), *Report of Operation DEEP FREEZE 68.*

Commander Fred Schneider, USN (Commanding Officer, Air Development Squadron Six, VX-6), to Dr. Henry M. Dater (Chief, History and Research Division, U.S. Naval Support Force, Antarctica), Ltr. of 6 Feb 1968.

APPENDIX A

History and Research Division, *Support for Science, Antarctica,* U.S. Naval Support Force, Antarctica, Washington, D.C., GPO, 1968, p. 2.

APPENDIX B

SCAR LogisticsWorking Group, *SCARLOG Manual,* Section 2291, Antarctic Air Operations History, I Argentina.

"International Flights in the Antarctic," *Bulletin of the U.S. Antarctic Projects Officer,* Vol. III, No. 5, pp. 2-3.

"Argentine Air Force Flies to South Pole," *Antarctic Journal of the United States,* Vol. I, No. 1, pp. 33-34.

P. F. Margalot, "The Argentine Flight to the Sough Pole, 1961-1962," *Symposium on Antarctic Logistics,* Washington, 1963, pp. 35-39.

J. A. Pittaluga, "Performance of the C-47 Aircraft in the Flight to the South Pole, 1961-1962," *ibid.* pp. 40-42.

E. L. Dionisi, "The Temporary Airstrip for the Flight to the South Pole, 1961-1962," *Ibid.* pp. 43-45.

R. A. Ferluga, "Special Preparation of the C-47 Airplane for Antarctic Flight," *Records of the Antarctic Treaty Meeting of Experts on Logistics,* Tokyo, 1968, pp. 418-437.

APPENDIX C

SCAR Logistics Working Group, *SCARLOG Manual,* Section 2211, Aircrafts used in Antarctica; Section 2291, Antarctic Air Operations History, II, USSR.

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